Electrifying Rail Baltica: pathways to sustainability and climate resilience

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Rail Baltica

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RB Rail and the three Baltic states signed the ENE Design & Build contract with COBELEC PS (Cobra Instalaciones y Servicios S.A. and Elecnor Servicios y Proyectos S.A.).

This marks the first major railway deployment across Estonia, Latvia, and Lithuania.

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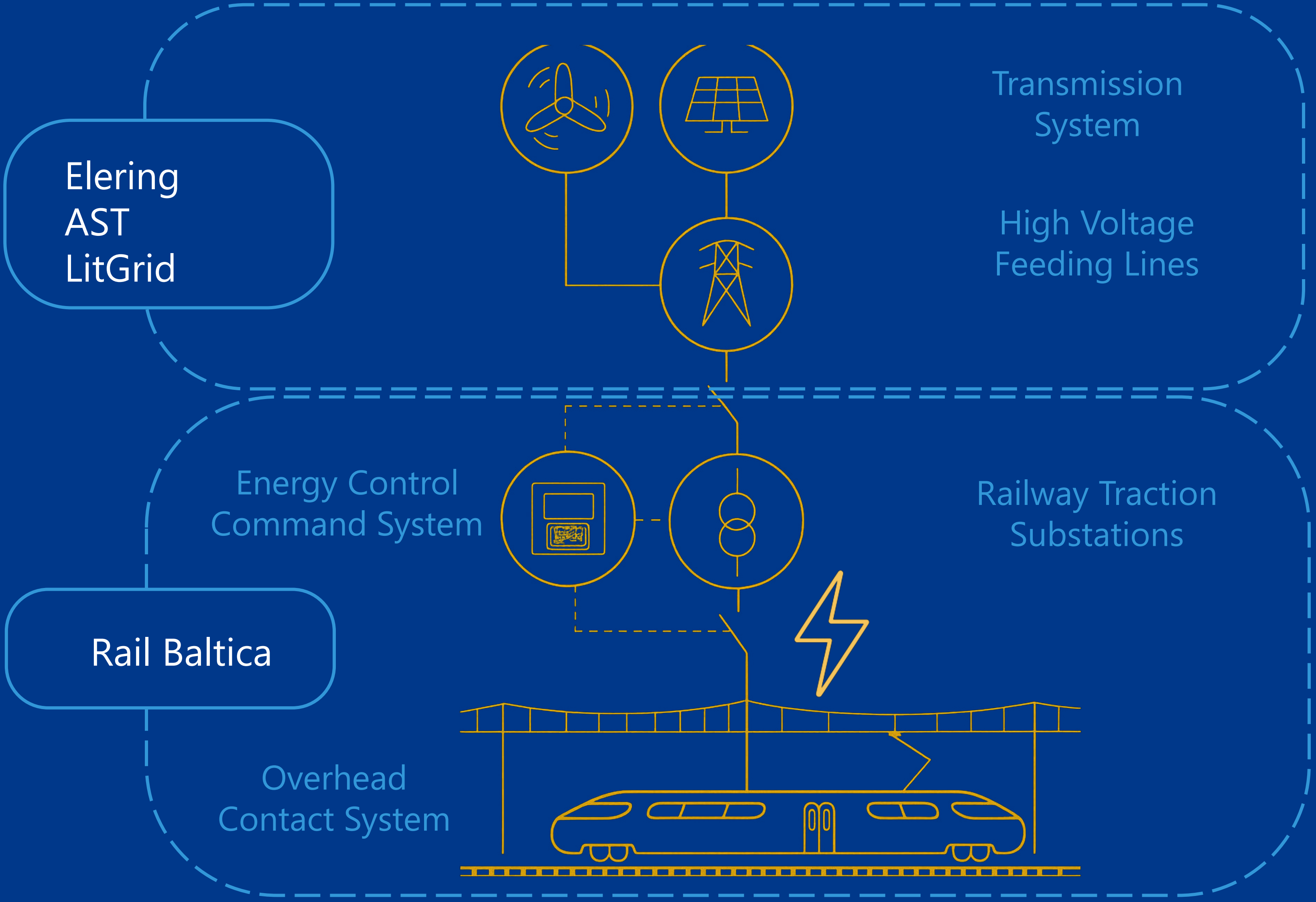
Rail Baltica energy sub-system: scope in a nutshell

Objectives for electrification

- Safety of operation and maintenance activities
- Railways need efficiency, availability, and reliability
- Life cycle cost saving
- Minimizing environmental footprint during all lifetime

How Rail Baltica’s energy system is designed



Scope

Rail Baltica will electrify 2,403 km of track — Europe's largest railway electrification project.

10 traction substations, 50,000 masts, 4,350 tons of copper

Pioneering Static Frequency Converters with a 2×25 kV system for higher reliability, efficiency, and sustainability

One unified electrification system across 3 Baltic states

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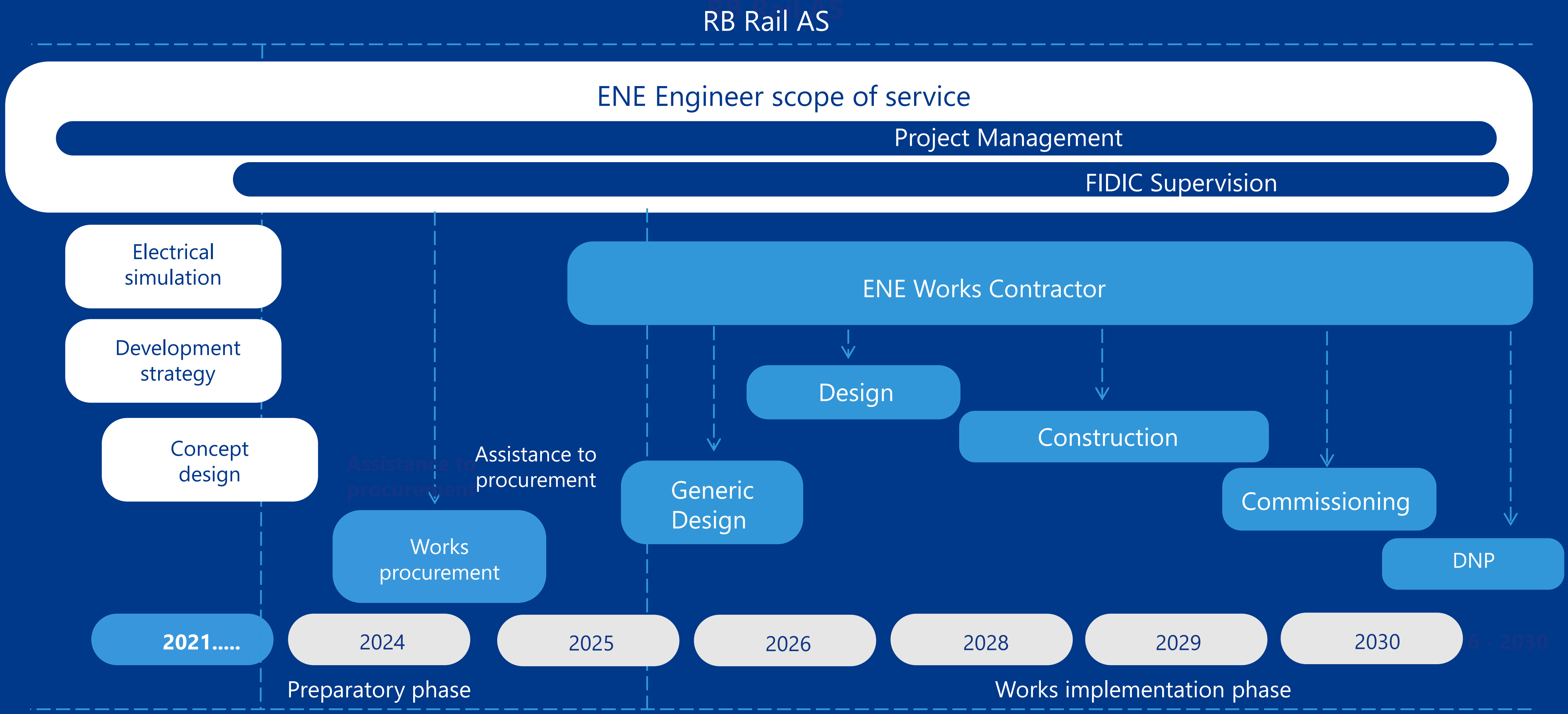
Rail Baltica ENE deployment timeline



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Rail Baltica electrification: overall sustainability strategy

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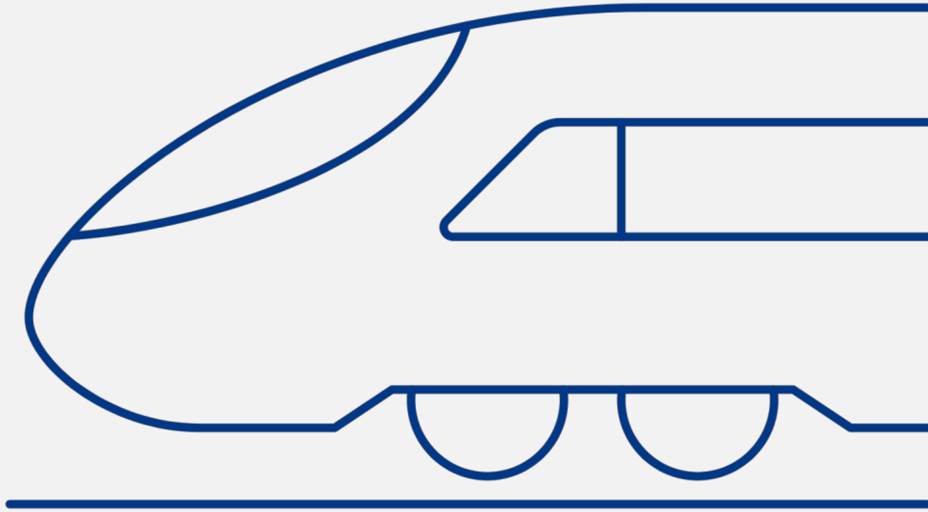
The transport sector is one of the largest greenhouse gas (GHG) emitters in the EU, with emissions rising from 19.7% to 25% since 2011

EU targets net-zero emissions by 2050, with a 55% cut by 2030.

By 2040, a 90% GHG reduction is recommended, including an 80% drop in transport emissions.

Reaching these goals requires a major expansion of renewable energy.

Shifting to mass transit and electrified rail is essential for low-carbon passenger and freight transport.



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Supporting the EU Green Deal

Shift to a greener, safer mode of transport will result in CO_2 emission reduction and contributes to climate change mitigation.

Aim for 100% use of renewable energy (82% less CO_2 than with Baltic current energy mix)

Savings estimated >150,000 tCO_2e per year of operation in 2030 and > 400,000 tCO_2e per year of operation by 2050

Contribution to energy independence, a key target of EU, enhancing energy security within the region

Aim to reduce GHG emissions through a modal shift towards rail and realize between EUR 2,7bn and 2,9bn in net GHG cost reduction

Optimising the energy use

Design optimisation led to maximise energy efficiency of Rail Baltica electrification system.

Optimised traction chain design, from HV connection to pantograph

Eco driving function though ATO

SFC technology allows a single electrical section on the entire corridor > much better reuse of regenerated electricity

Freight trains will use 11% less energy per ton.km than reference case (Germany)
7,3 kW.h/ton.km versus 8,3

Passengers' trains will use 44% less energy per passenger.km than reference case (Germany)
6,2 kW.h/p.km versus 11

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Rail Baltica electrification: sustainable design

During design phase, ENE Contractor shall make extensive use of Environment Life-Cycle assessment tools

Demonstration cases for the selection of the material with lower impact, and optimising the design of every component, finding right compromise between performance, lifetime and environmental impact

Example: catenary mast – steel rather than concrete, with optimised shape and coating

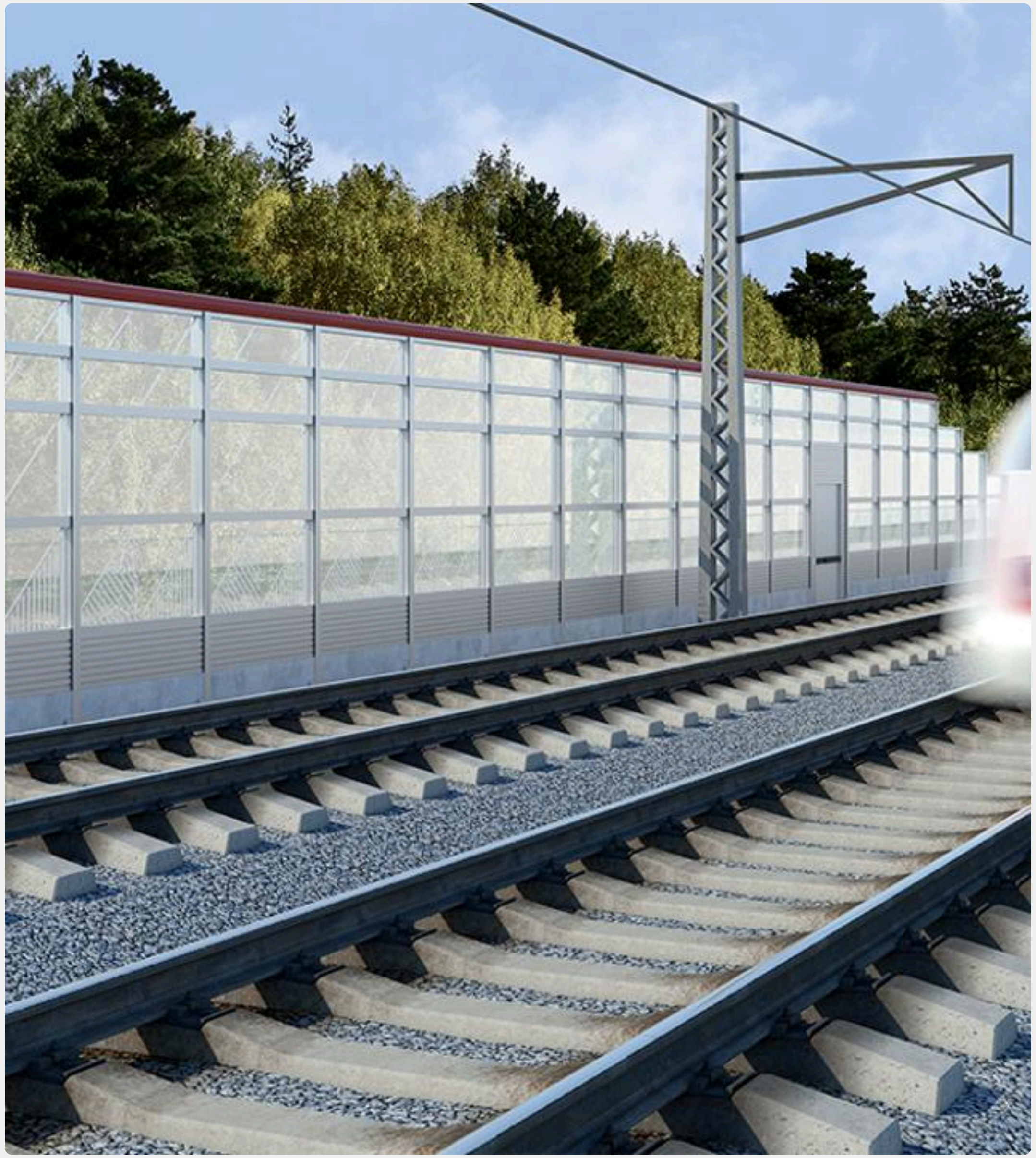
Resilience to climate change

Designed for a 100-year lifespan and full climate resilience.

Design guidelines are based on a comprehensive climate-impact assessment.

Adaptation covers: flooding, storms, wind, ground instability, lightning, extreme temperatures, snow, freezing rain, frost, fog, drought, and wildfires.

Electrification systems account for heat, storms, wind, and icing impacts on catenaries and ETCS equipment.



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Thank you!

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